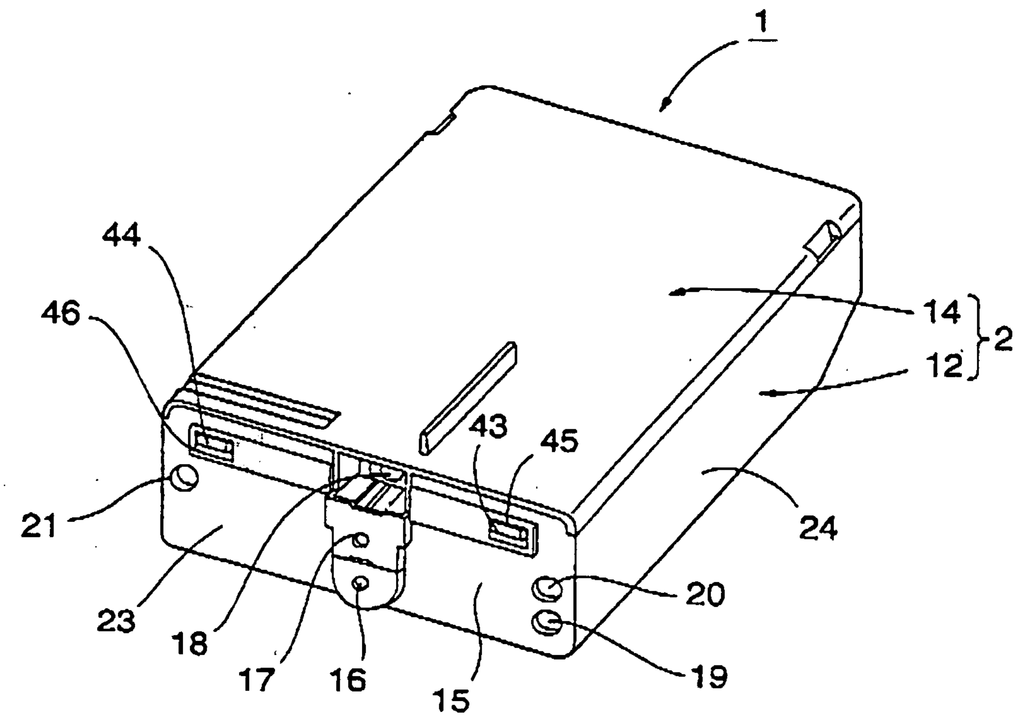
Fig.1


1
44
46
14
12
2
43
45
21
24
23
18
17
16
15
20
19

09572458 .013001

Fig.2

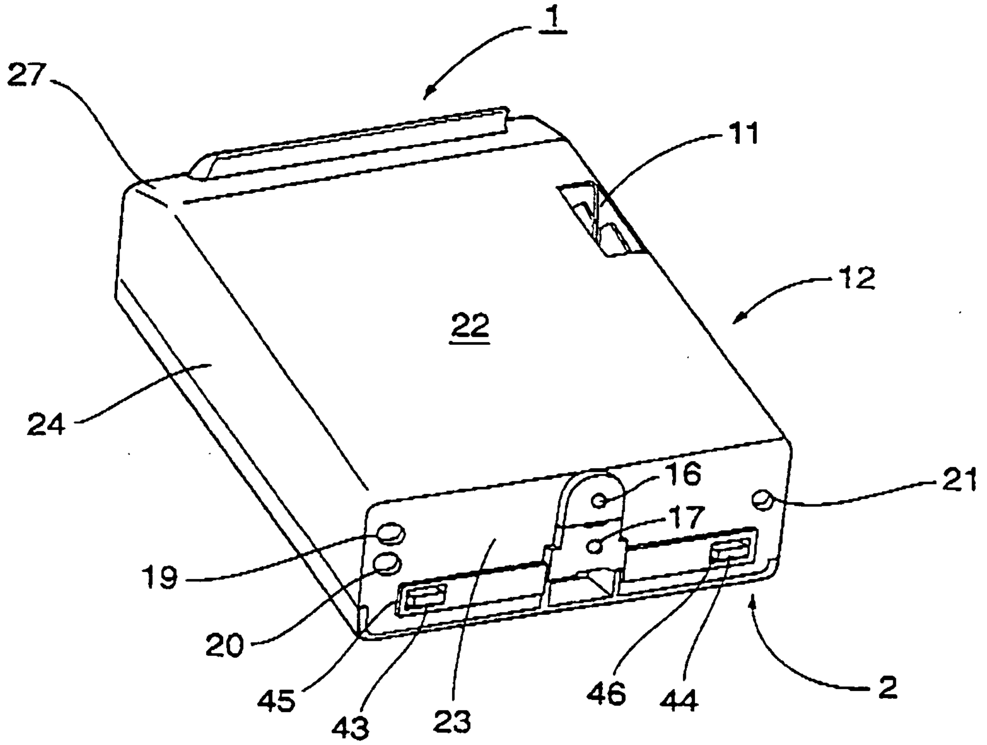
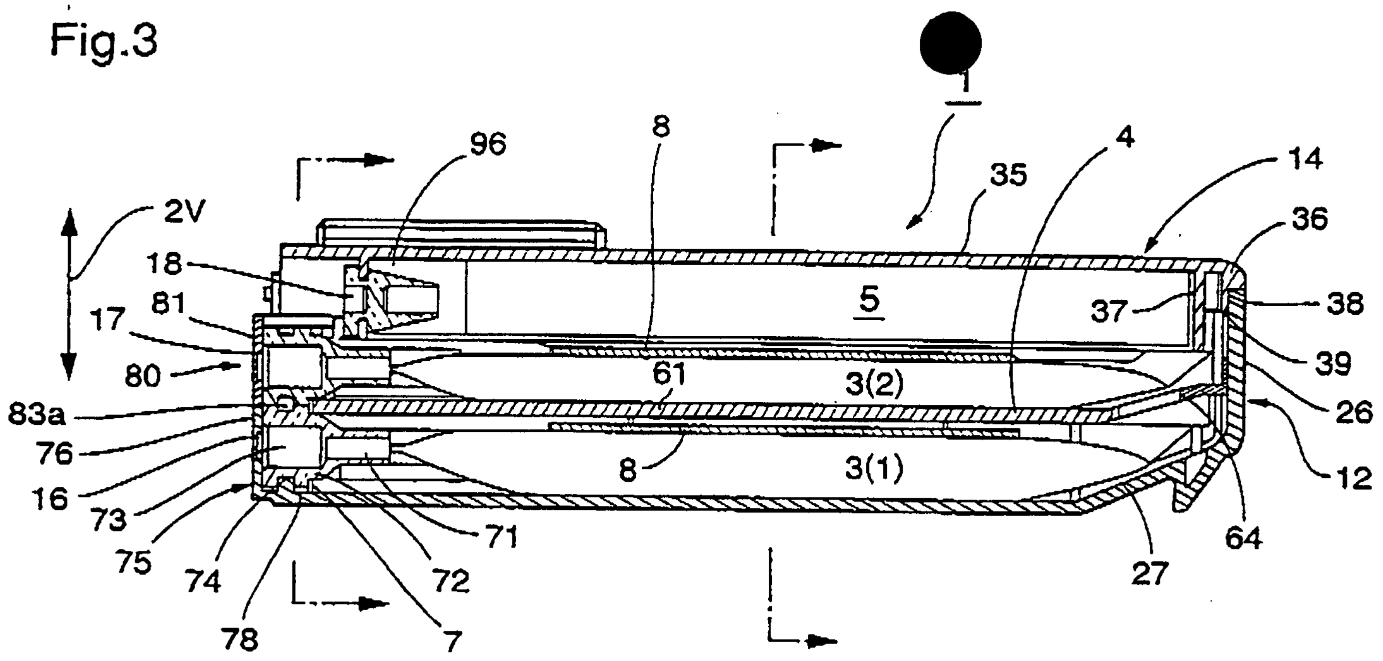
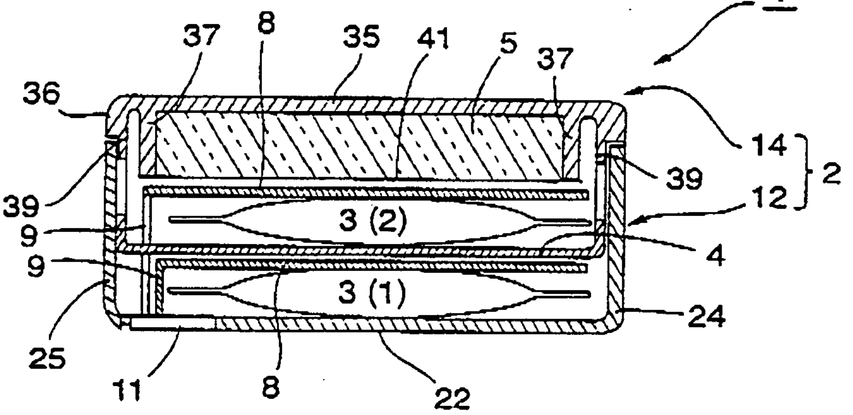

1
27
11
12
22
24
16
21
17
19
20
45
43
23
46
44
2

Fig.3



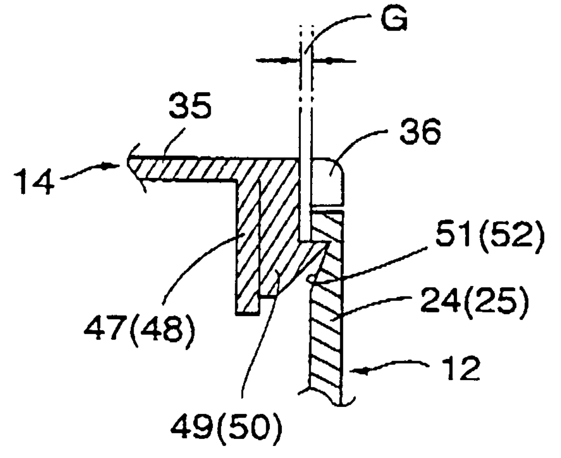
1
96
8
35
4
14
36
2V
18
81
17
80
83a
76
16
73
75
74
78
7
72
71
5
37
38
39
61
3(2)
26
8
3(1)
12
64
27

Fig.4



1
37
8
35
41
5
37
36
14
39
39
2
9
3 (2)
12
9
4
3 (1)
24
25
11
8
22

Fig.6



G
35
36
14
51(52)
47(48)
24(25)
12
49(50)

Fig.5

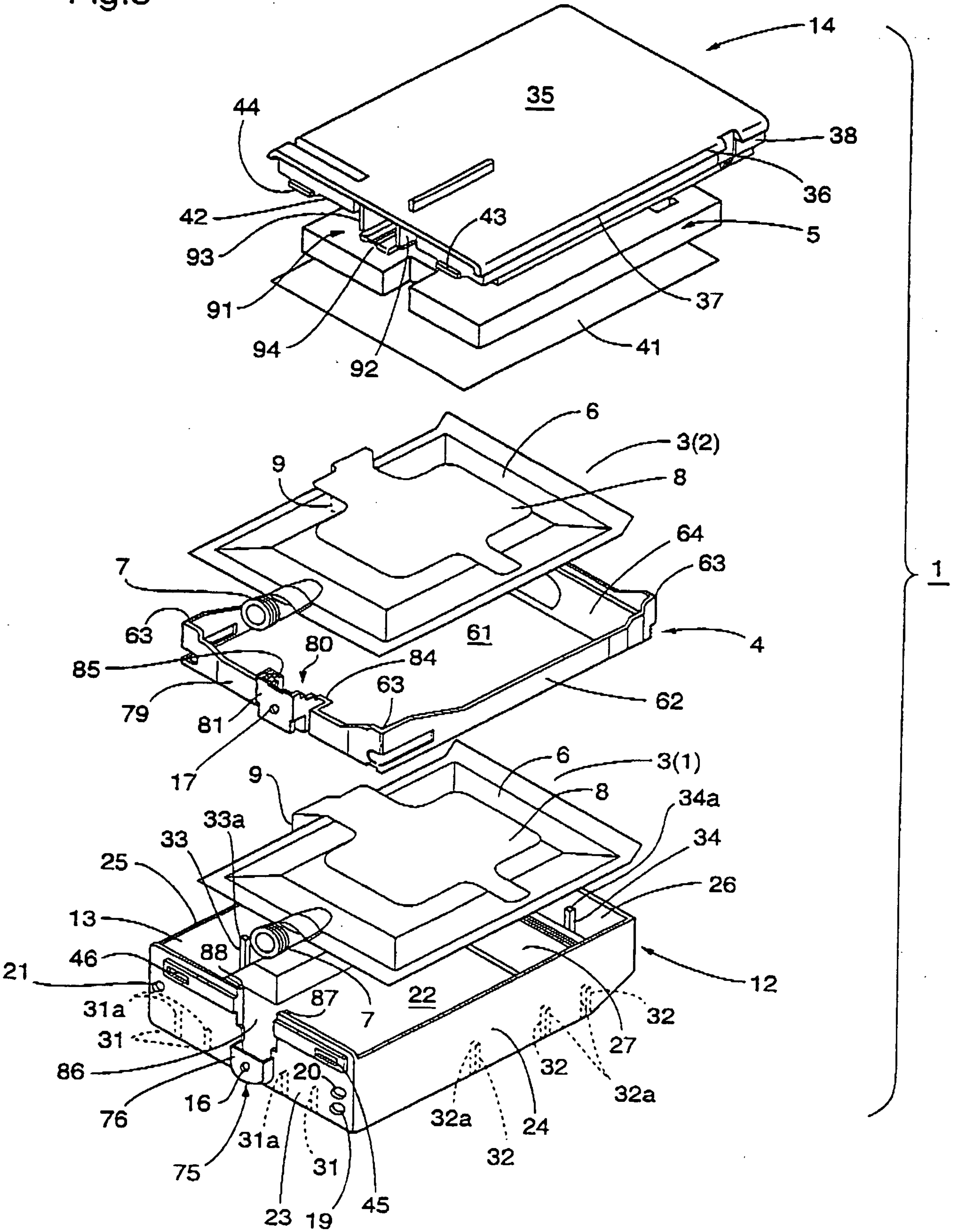
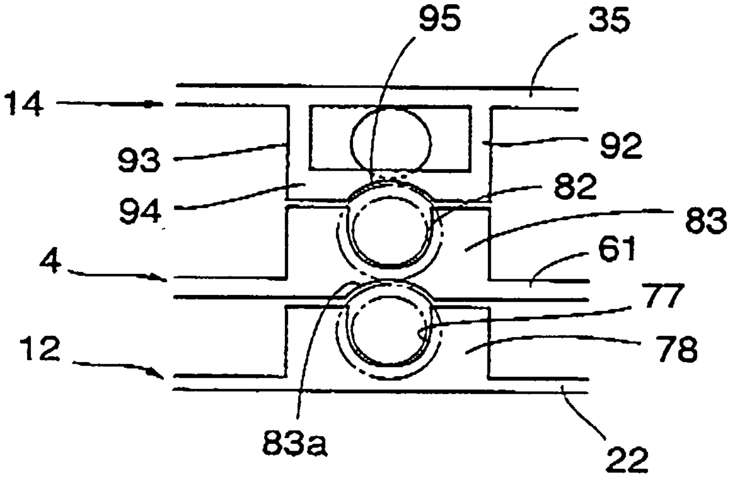


Fig.7


95
35
14
93
92
94
82
83
4
61
77
12
78
83a
22

09774260.013001

Fig.8

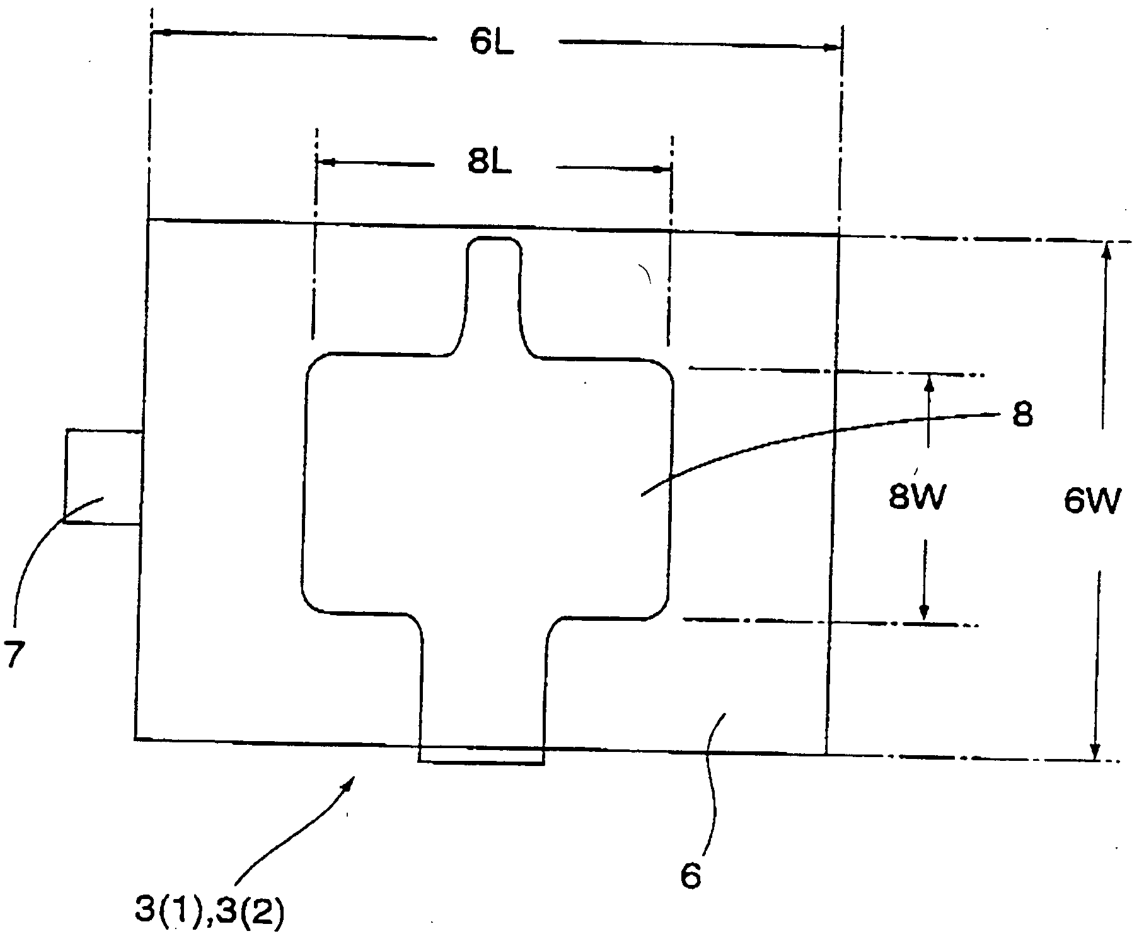
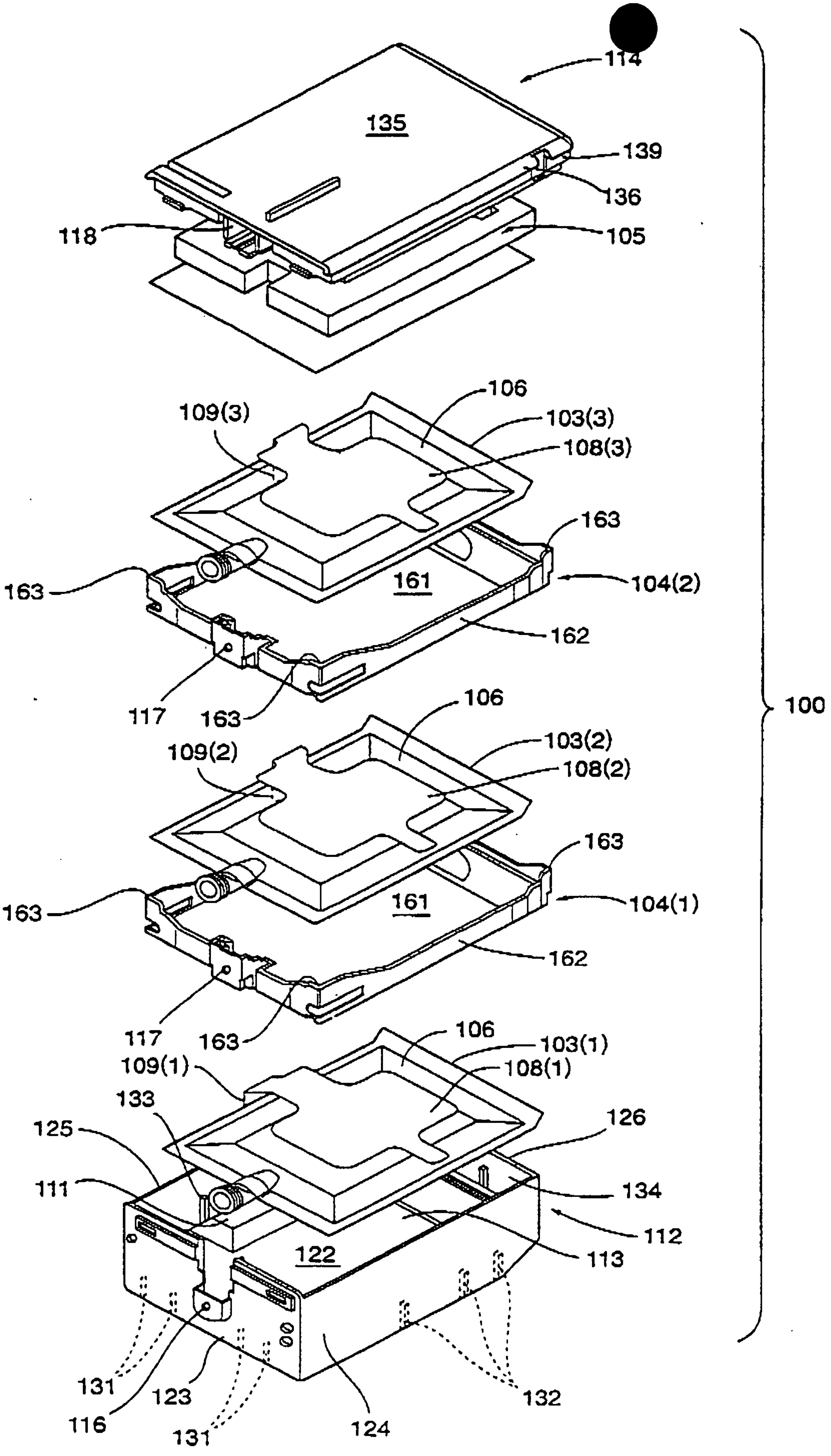
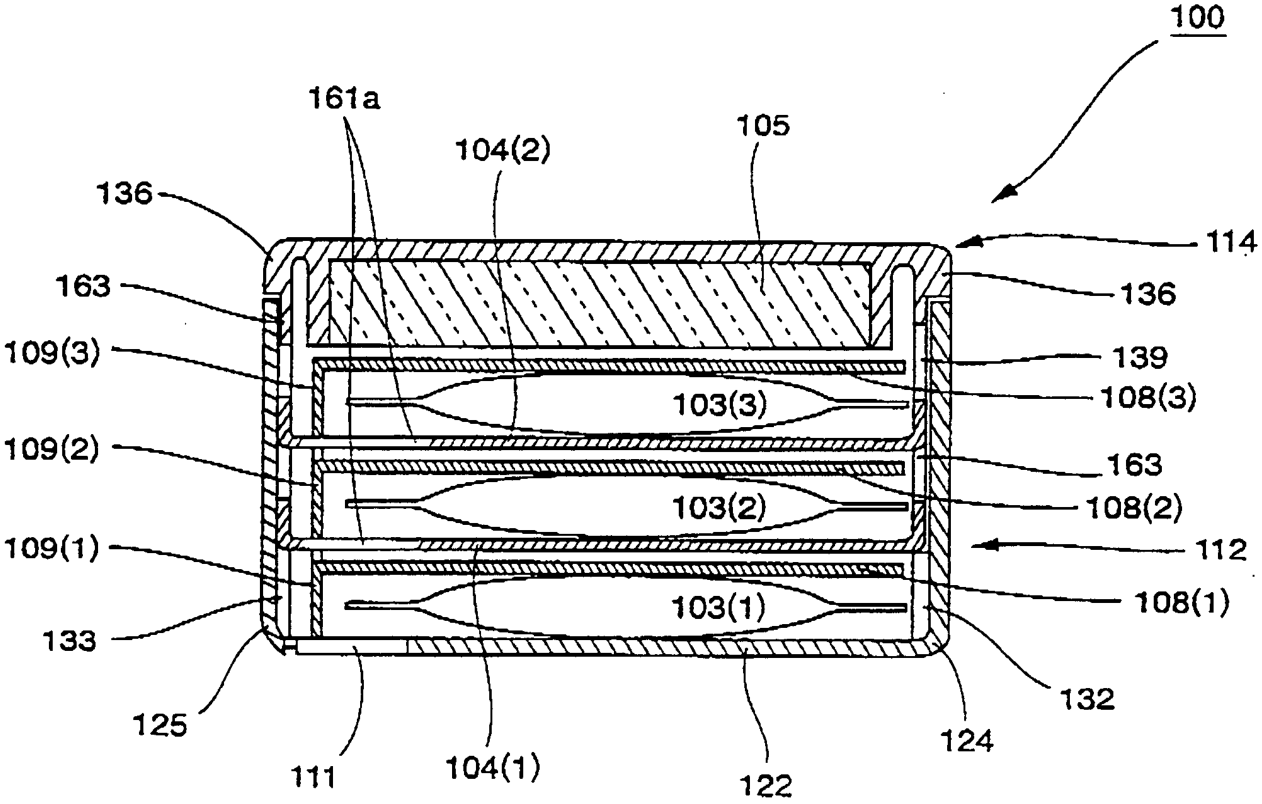

6L
8L
8
8W
6W
7
3(1),3(2)
6

Fig.9


114
135
139
136
118
105
106
109(3)
103(3)
108(3)
163
163
104(2)
161
162
117
163
100
106
109(2)
103(2)
108(2)
163
163
104(1)
161
162
117
163
106
103(1)
109(1)
108(1)
133
125
126
111
134
112
122
113
131
123
116
131
124
132

09972456.013001

Fig.10


100
161a
104(2)
105
136
114
163
136
109(3)
139
108(3)
103(3)
109(2)
163
103(2)
108(2)
109(1)
112
103(1)
108(1)
133
132
125
124
111
104(1)
122

09771942 .013001

Fig.11

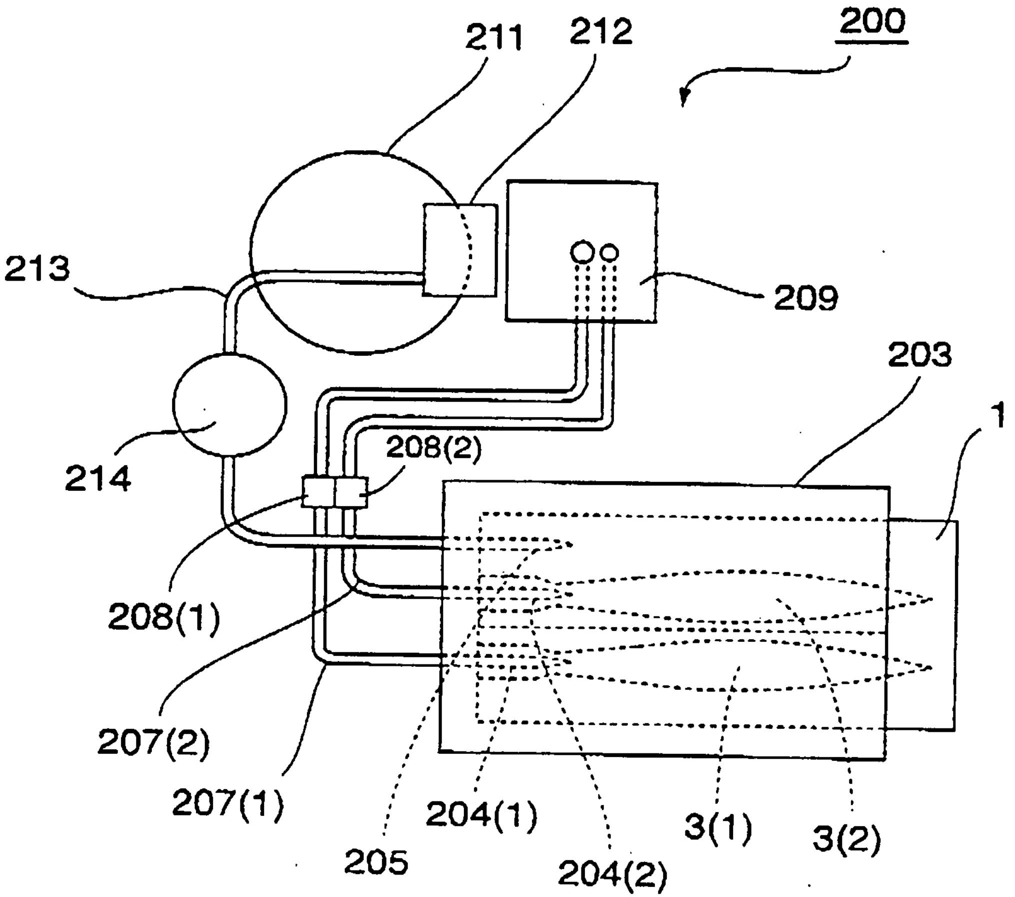
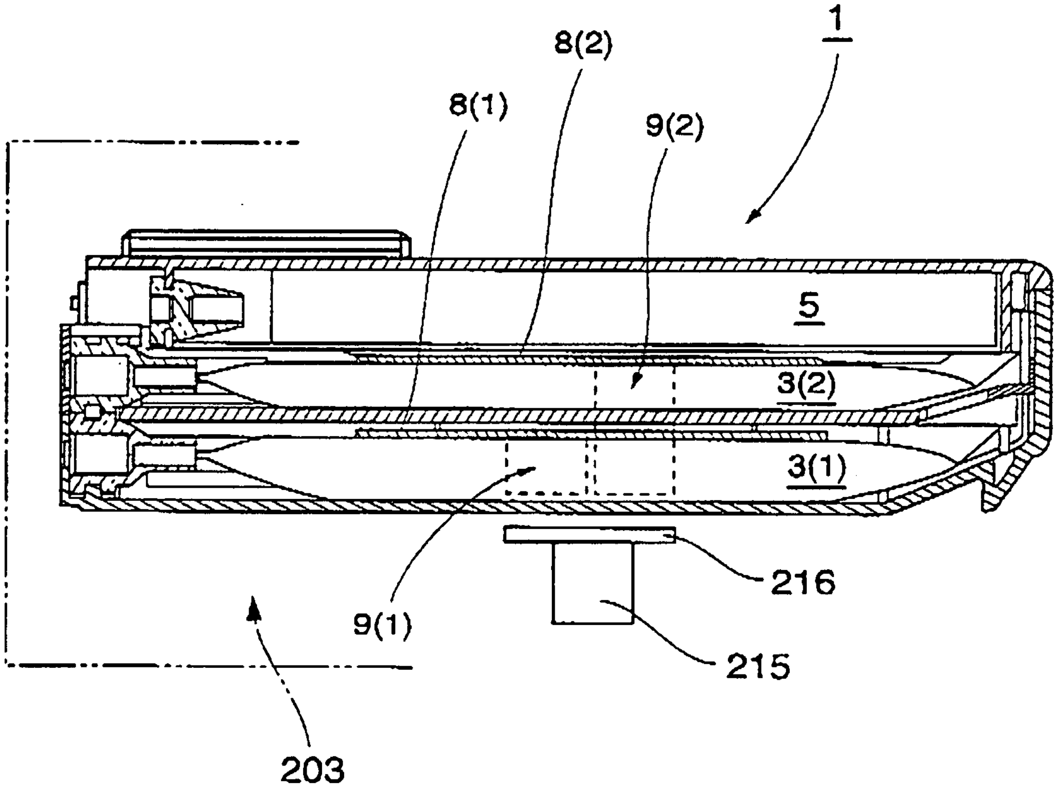


Fig.12


1
8(2)
8(1)
9(2)
5
3(2)
3(1)
216
215
9(1)
203

09575240 .013001

Fig.13

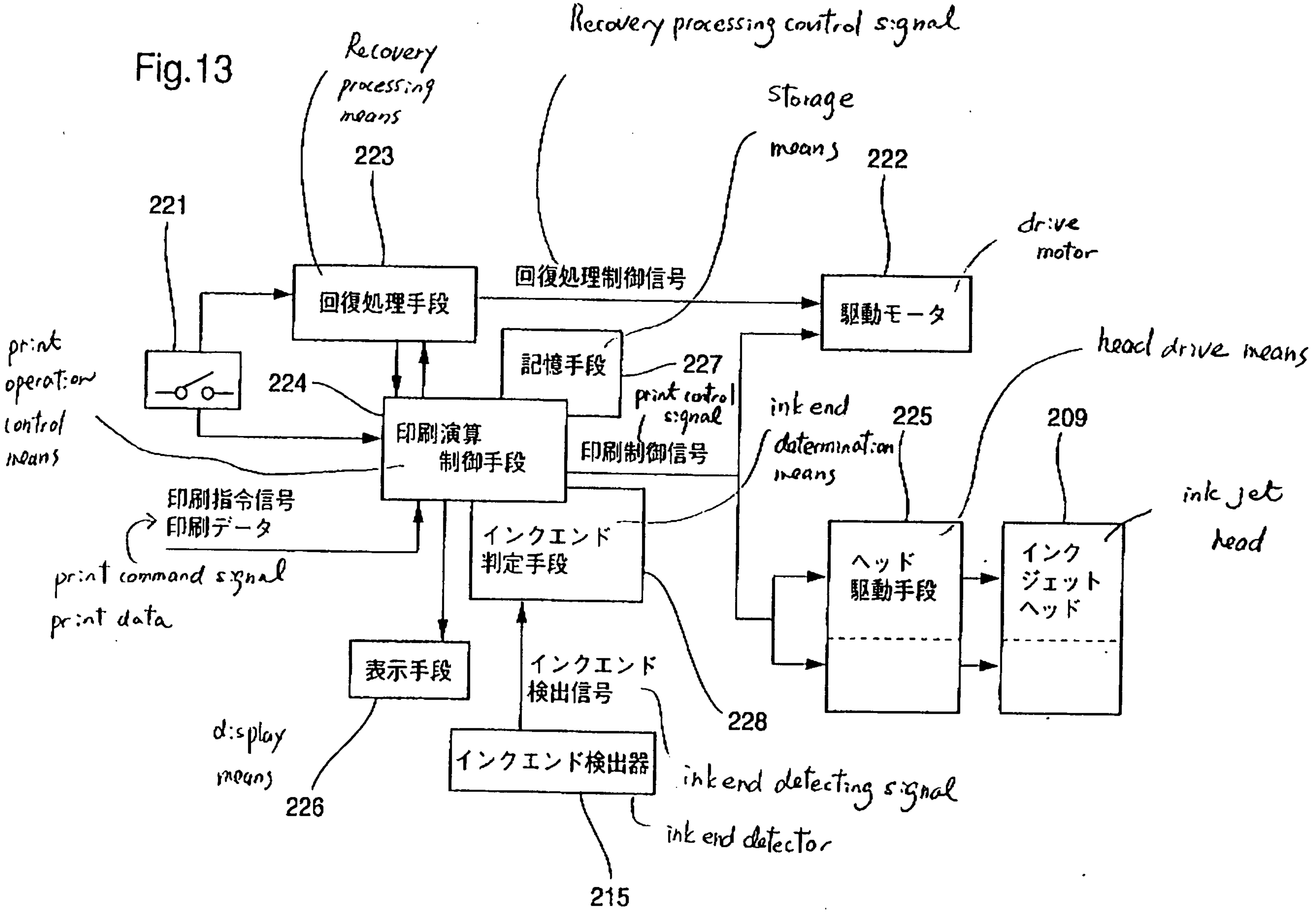

Recovery processing control signal
Recovery processing means
223
Storage means
222
221
回復処理手段
回復処理制御信号
drive motor
駆動モータ
print operation control means
224
記憶手段
227
print control signal
印刷演算 制御手段
印刷制御信号
ink end determination means
225
209
head drive means
ink jet head
印刷指令信号
印刷データ
print command signal
print data
インクエンド 判定手段
ヘッド 駆動手段
インク ジェット ヘッド
表示手段
インクエンド 検出信号
228
display means
226
インクエンド検出器
ink end detecting signal
ink end detector
215

Fig.14

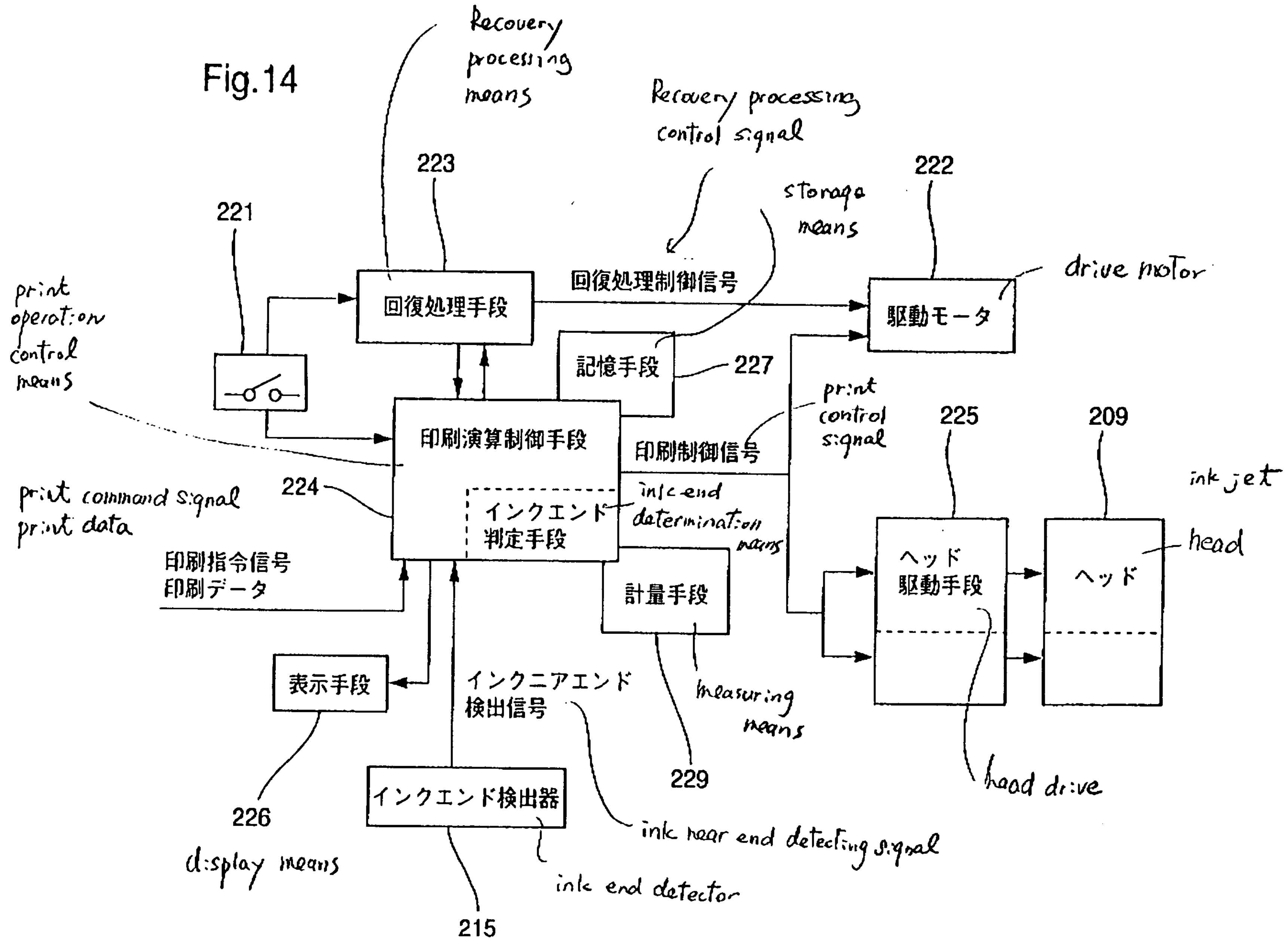
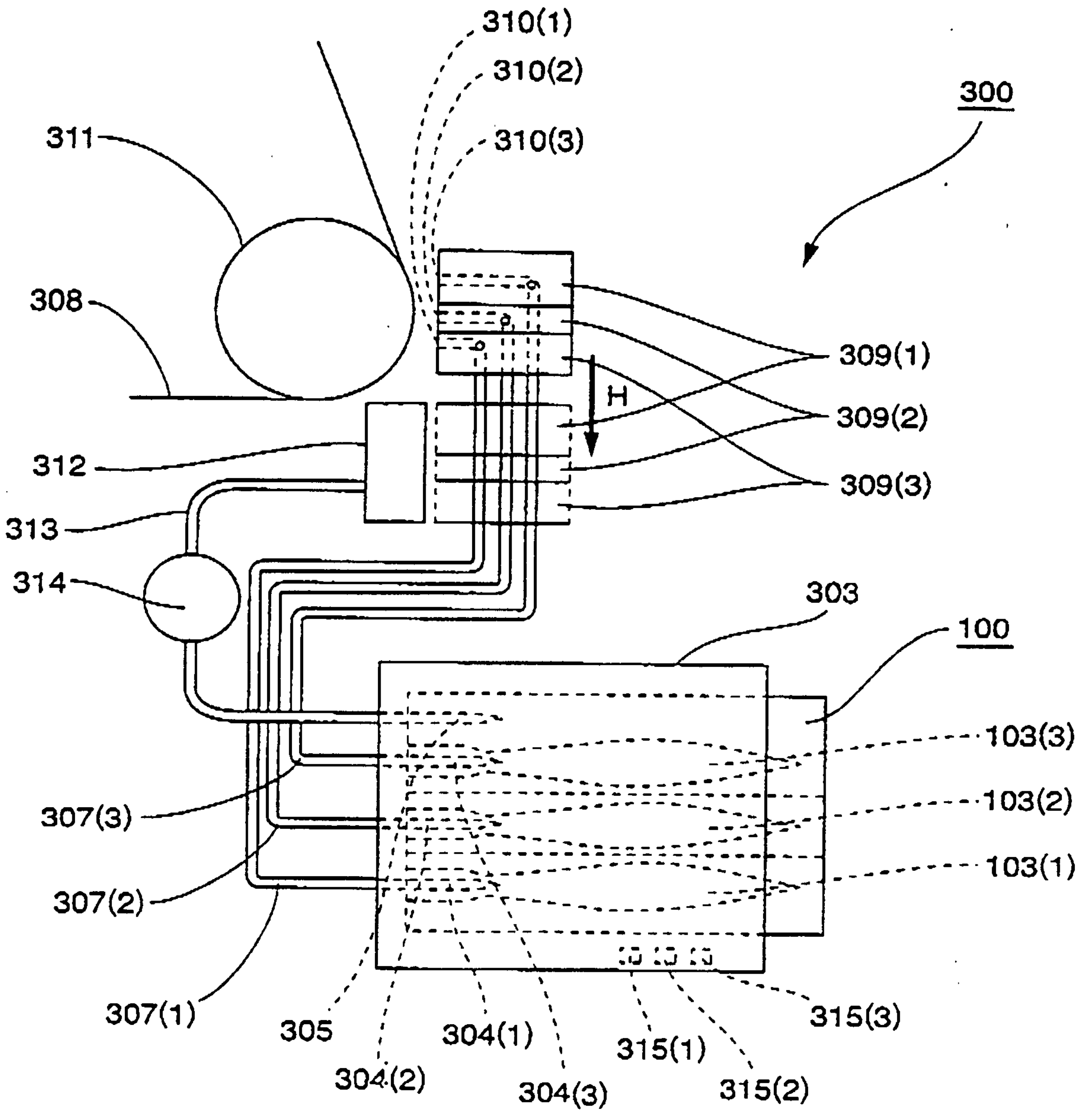
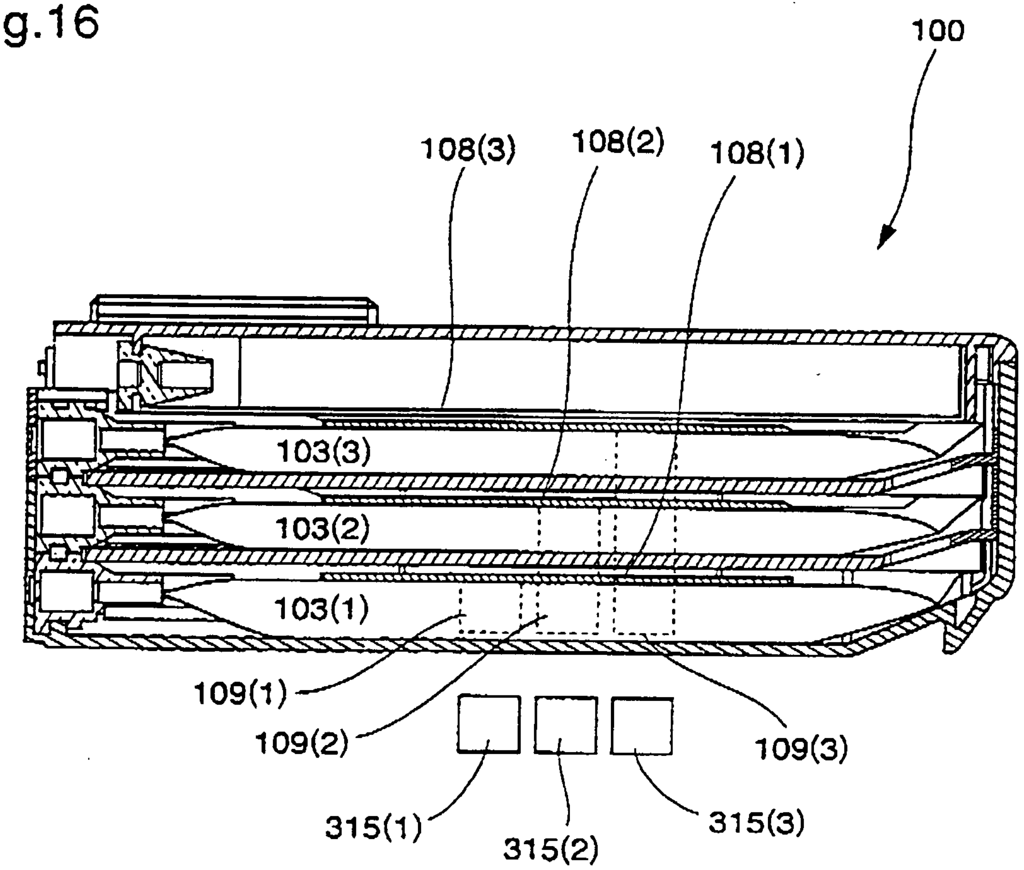

Recovery processing means
Recovery processing control signal
223
221
storage means
222
drive motor
print operation control means
回復処理手段
回復処理制御信号
駆動モータ
記憶手段
227
print control signal
印刷演算制御手段
印刷制御信号
225
209
ink jet
224
print command signal
print data
ink end determination means
インクエンド判定手段
head
ヘッド駆動手段
ヘッド
印刷指令信号
印刷データ
計量手段
表示手段
インクニアエンド検出信号
measuring means
229
head drive
226
インクエンド検出器
ink near end detecting signal
display means
ink end detector
215

Fig.15



H

Fig.16


100
108(3)
108(2)
108(1)
103(3)
103(2)
103(1)
109(1)
109(2)
109(3)
315(1)
315(2)
315(3)

09546245 .041300

Fig.17

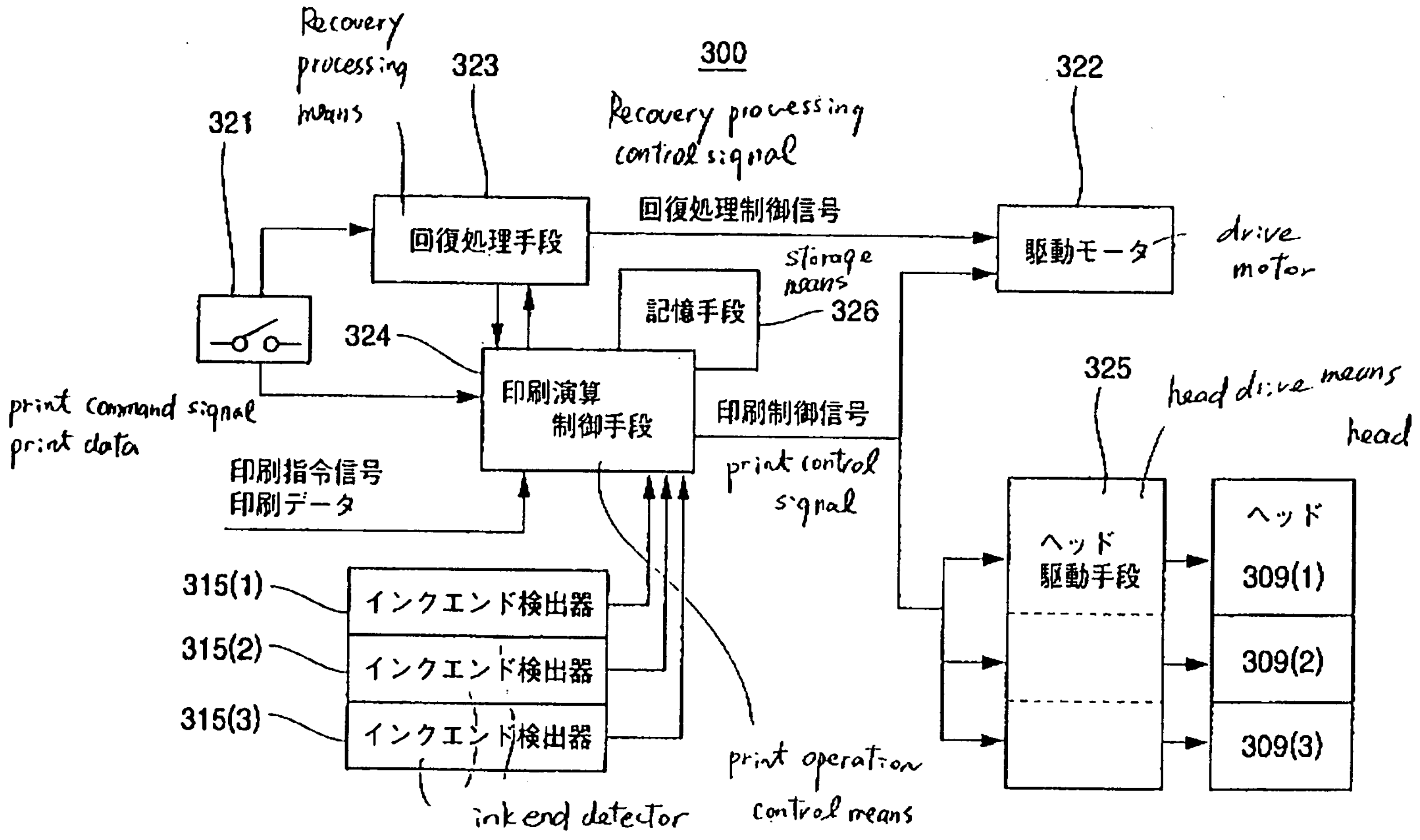

300
321
Recovery processing means
323
回復処理手段
Recovery processing control signal
回復処理制御信号
322
駆動モータ
drive motor
記憶手段
storage means
326
324
印刷演算制御手段
印刷制御信号
print control signal
print command signal
print data
印刷指令信号
印刷データ
325
head drive means
ヘッド駆動手段
head
ヘッド
309(1)
309(2)
309(3)
315(1)
315(2)
315(3)
インクエンド検出器
インクエンド検出器
インクエンド検出器
ink end detector
print operation control means

Fig.18

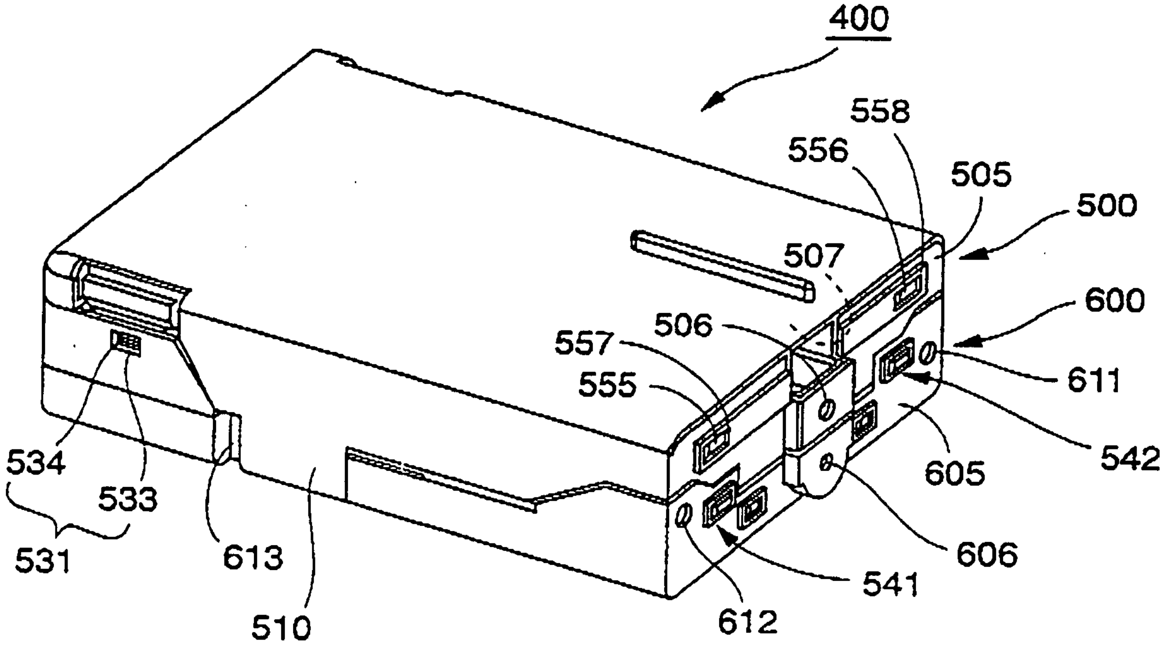

400
558
556
505
500
507
506
557
555
600
611
542
605
606
541
612
534
533
531
613
510

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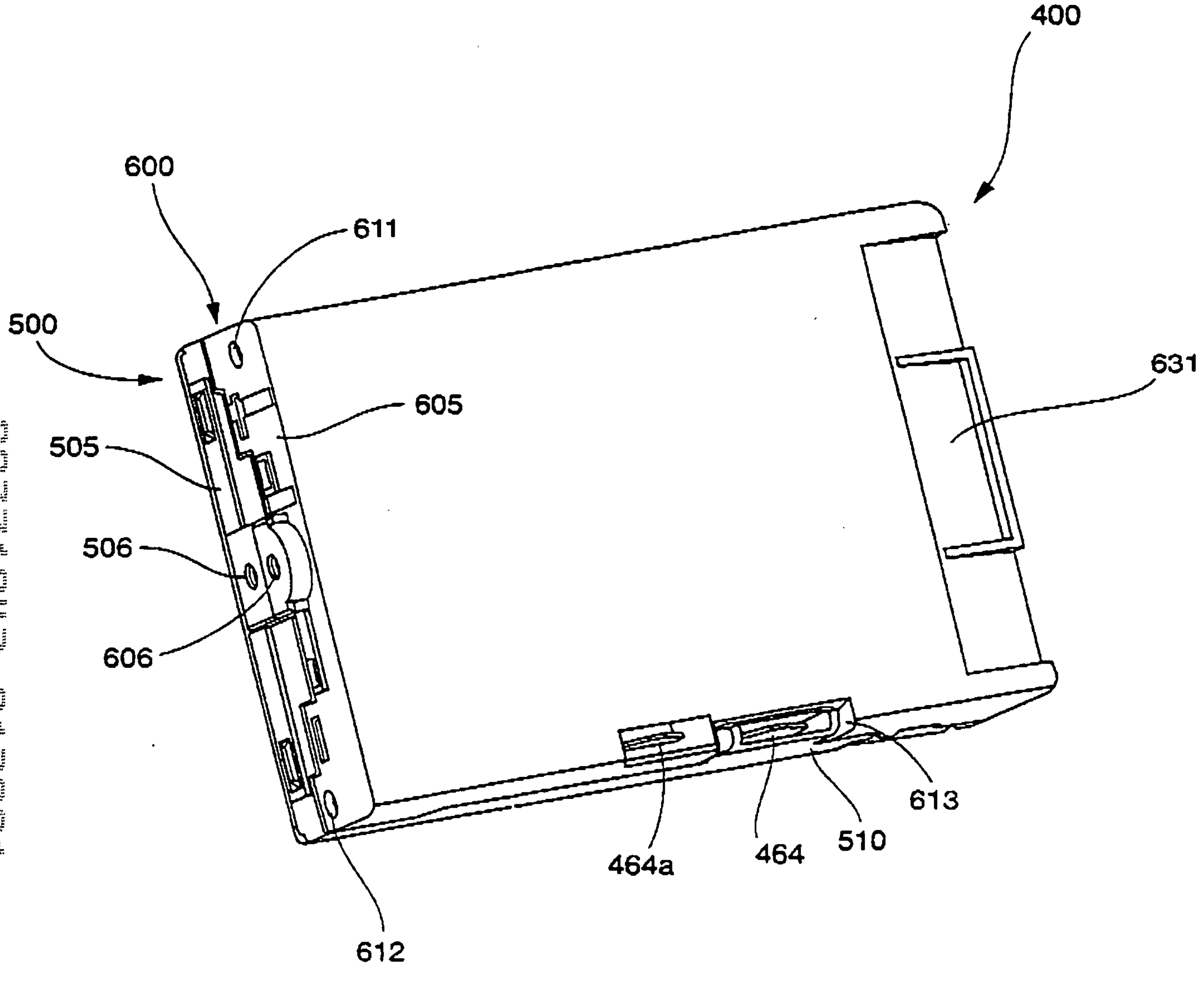
Fig.19


400
600
611
500
605
631
505
506
606
613
510
464
464a
612

09774542 .013001

Fig.20

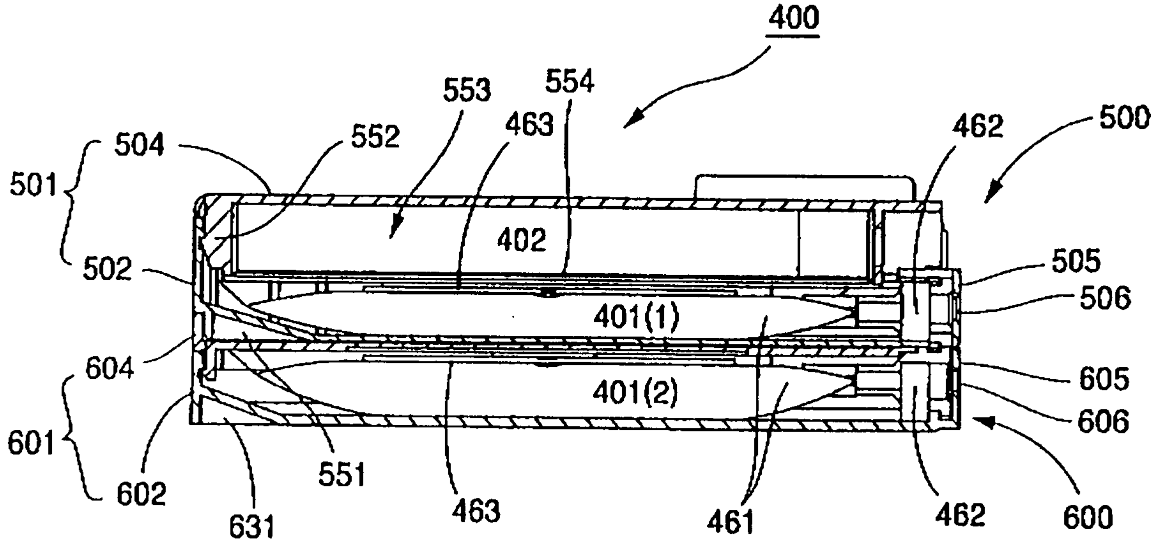
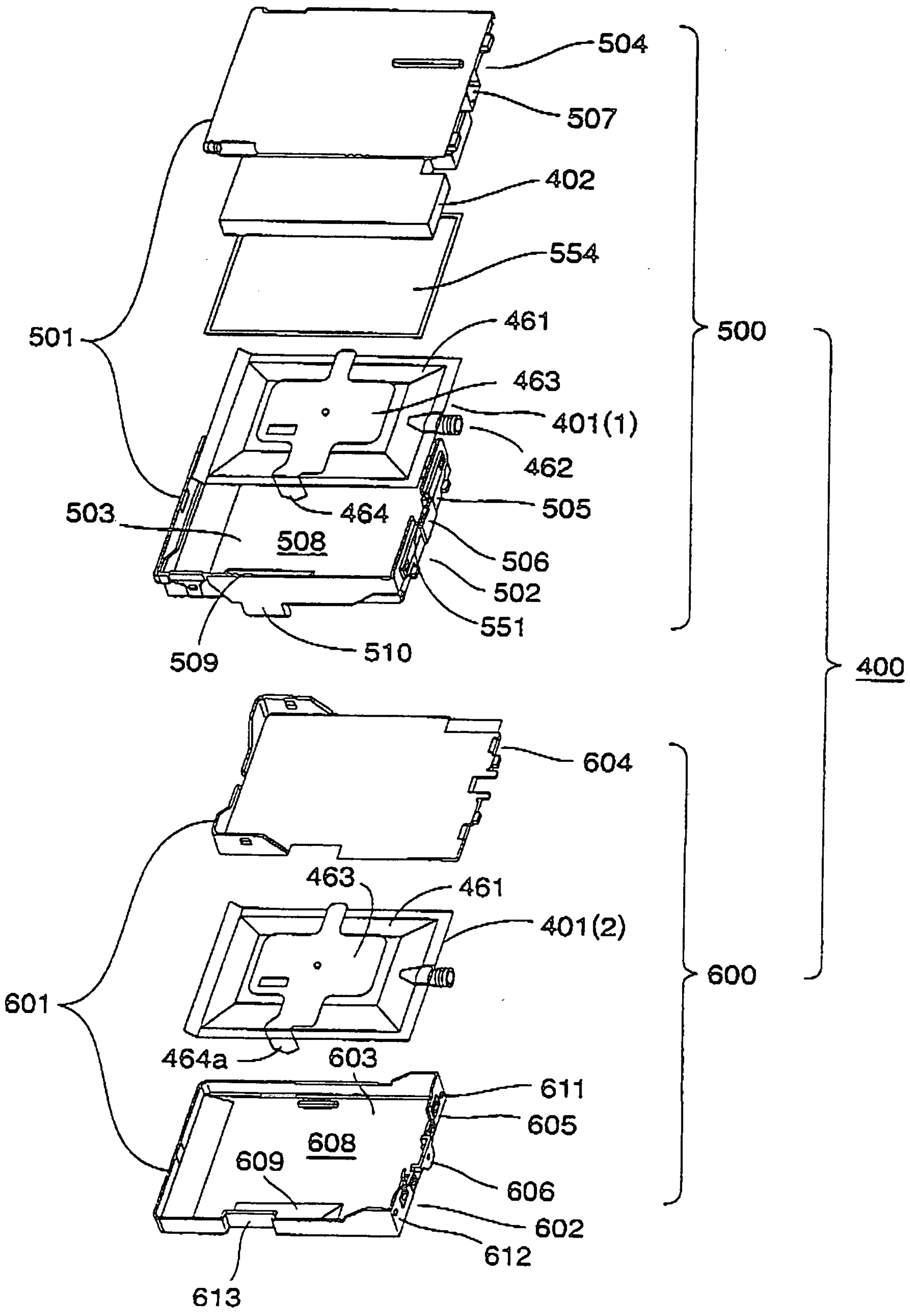


Fig.21


504
507
402
554
501
461
463
401(1)
462
503
464
505
508
506
502
551
509
510
500
400
604
463
461
401(2)
601
600
464a
603
611
605
608
609
606
602
612
613

09727345 .010501

09771942.010501

Fig.22

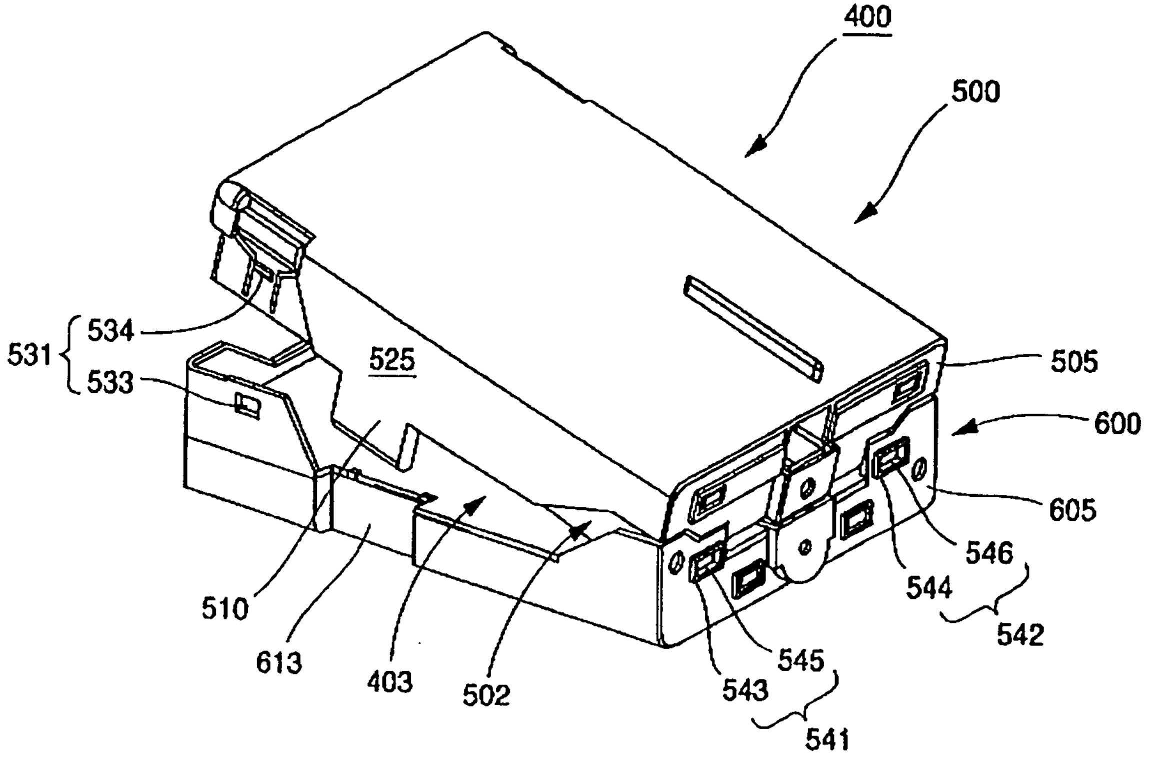
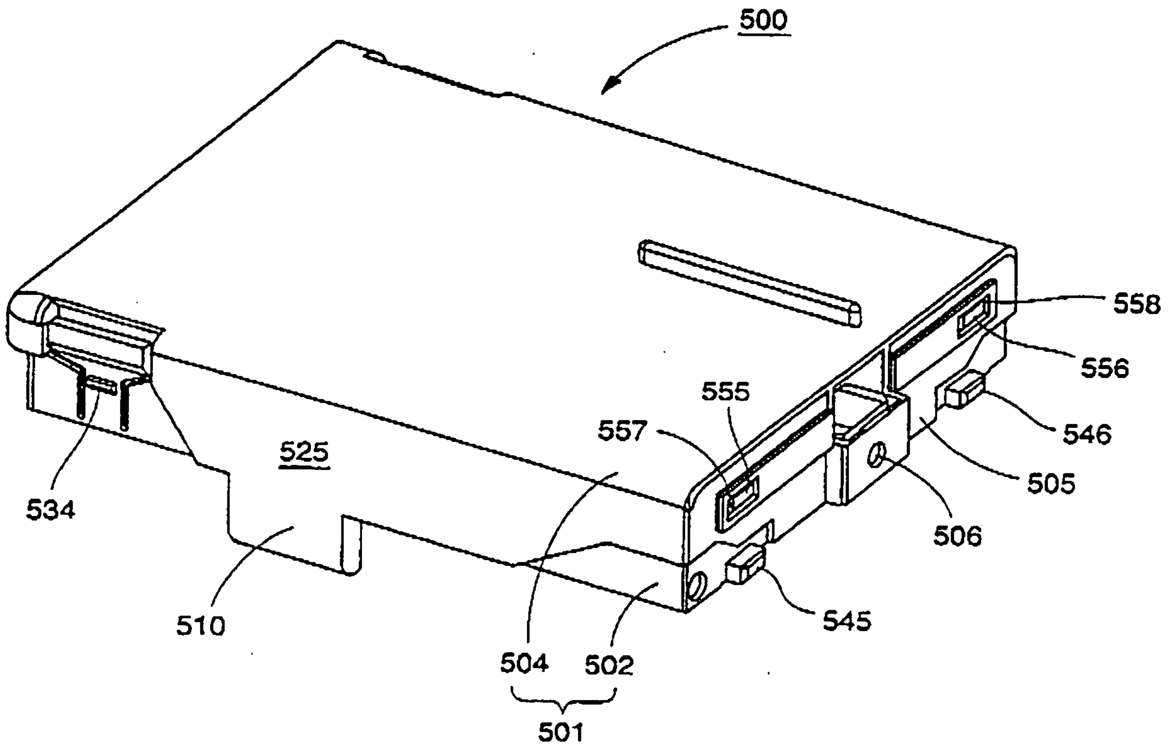
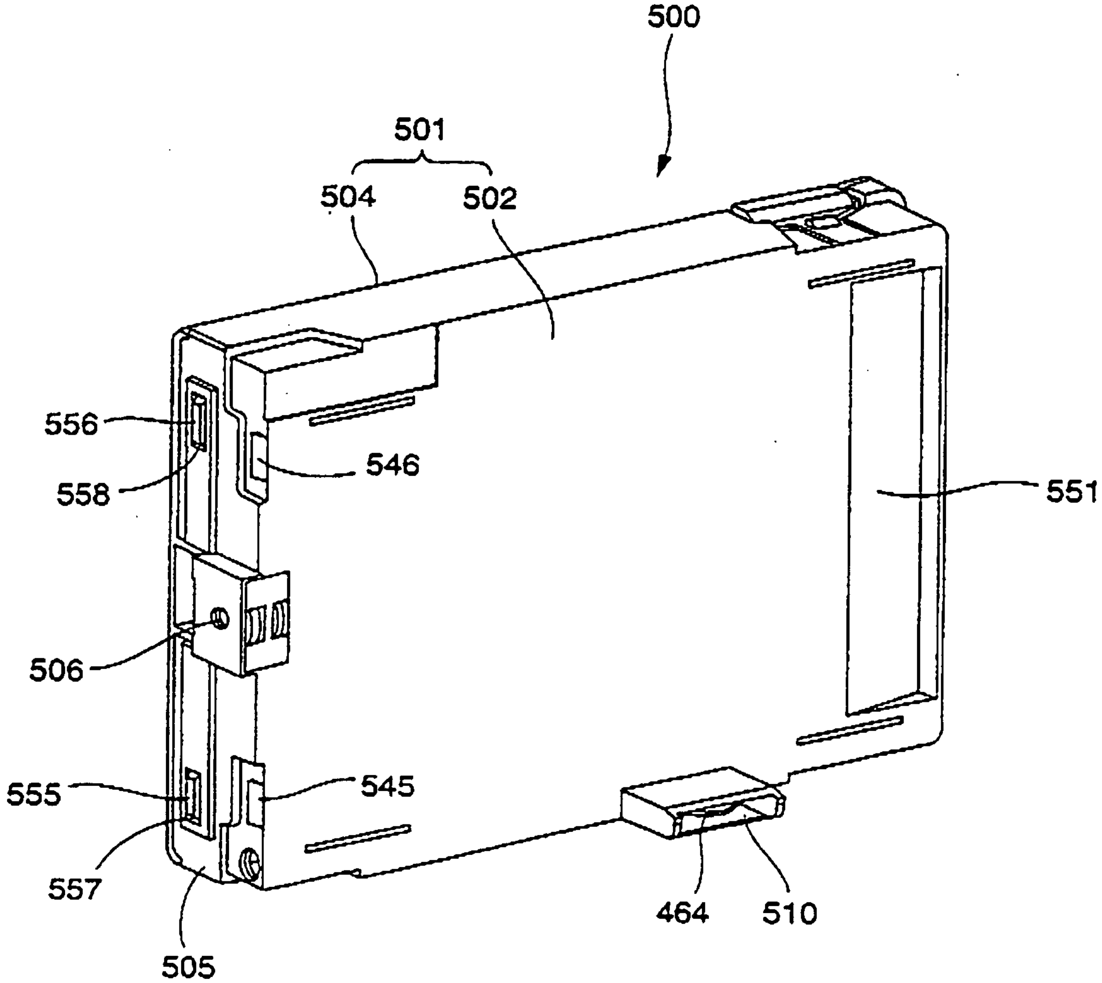

400
500
531
534
533
525
505
600
605
546
544
542
510
613
403
502
545
543
541

Fig.23


500
558
556
555
557
546
534
525
505
506
510
545
504
502
501

09771942.013001

Fig.24


500
501
504
502
556
558
546
551
506
555
545
557
505
464
510

09771942.013001

09771942.012001

Fig.25

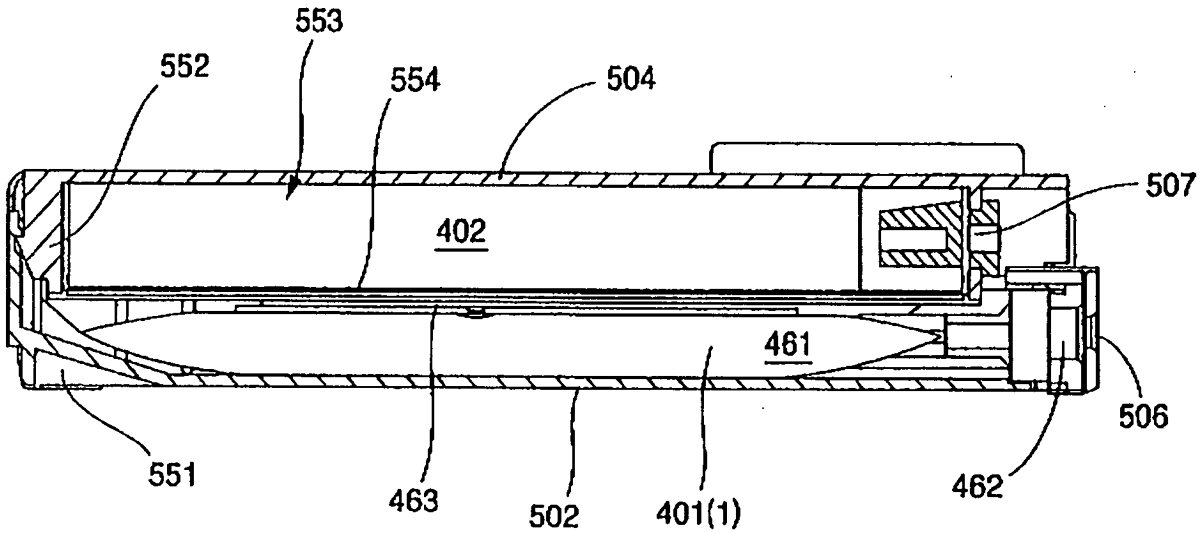

553
552
554
504
507
402
461
506
551
463
502
401(1)
462

Fig.26

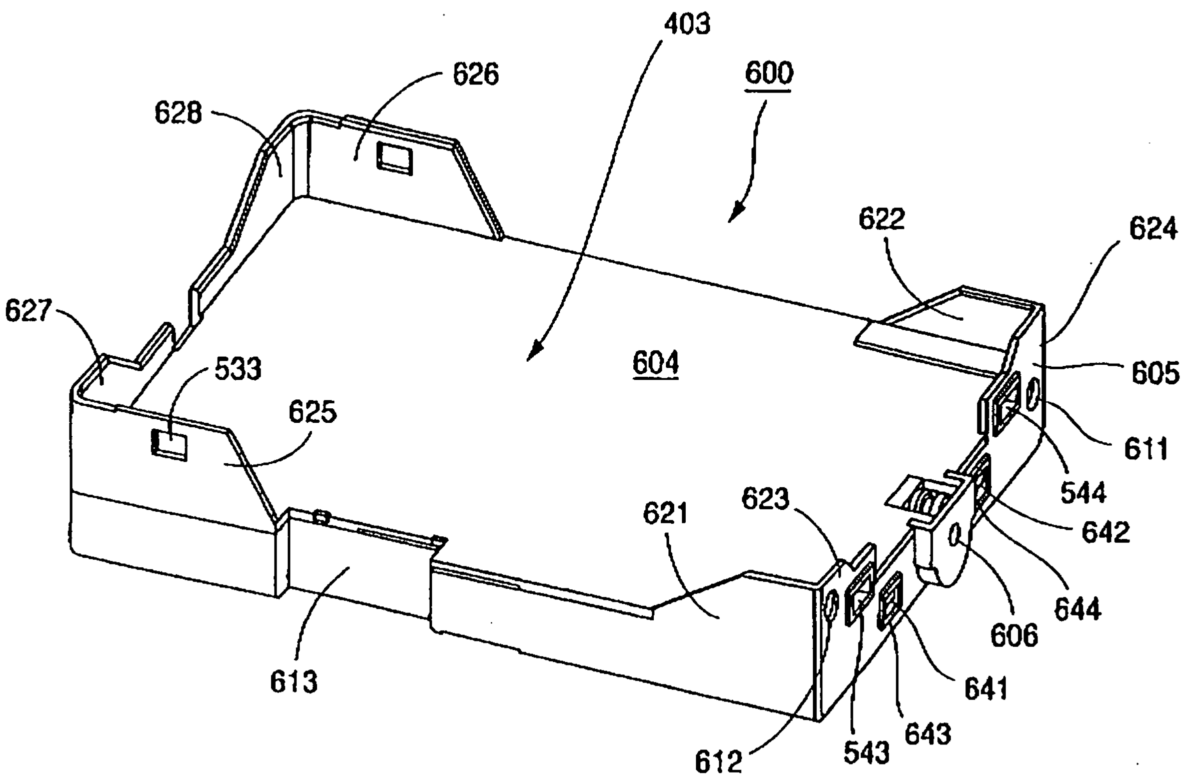
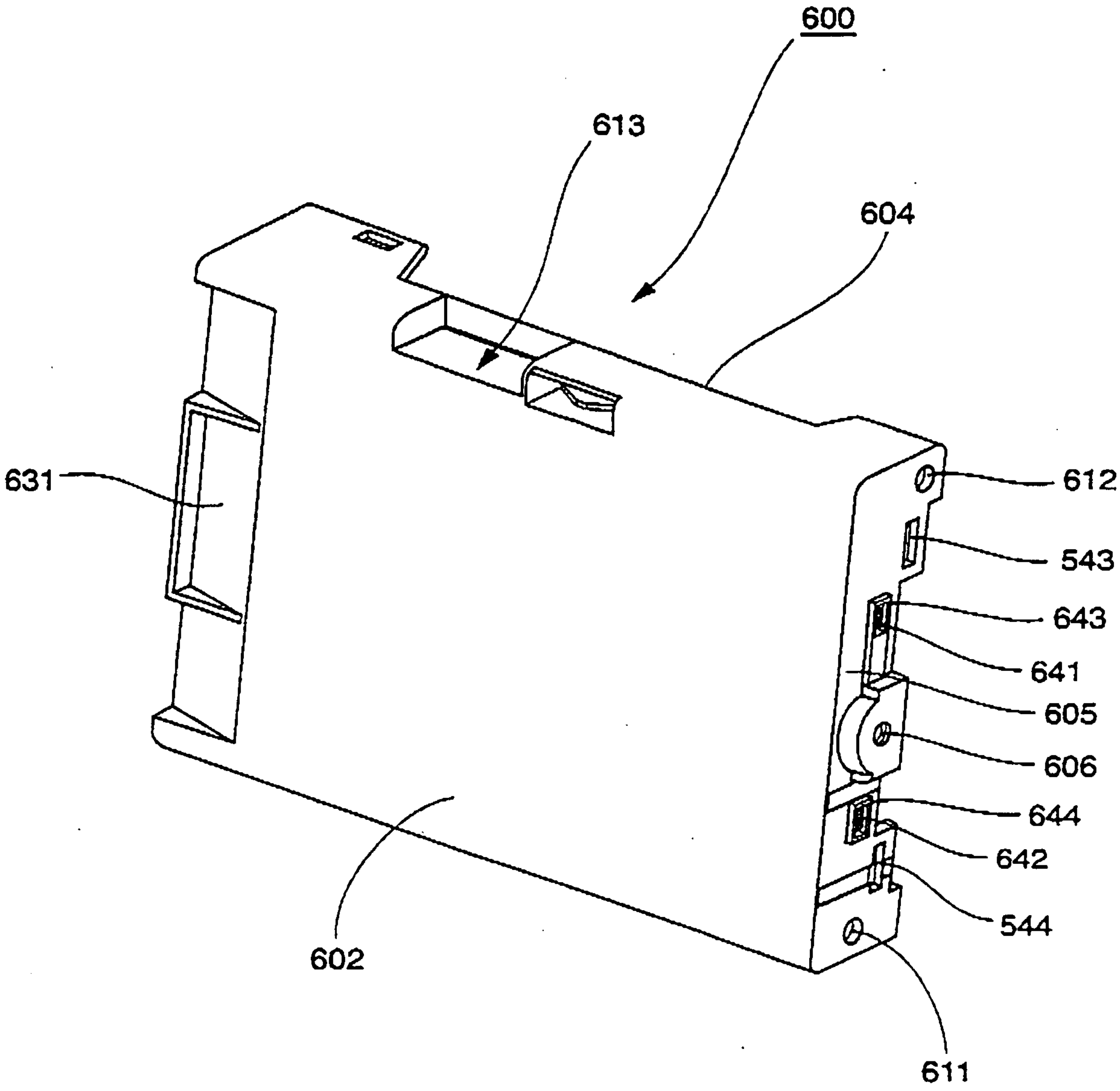


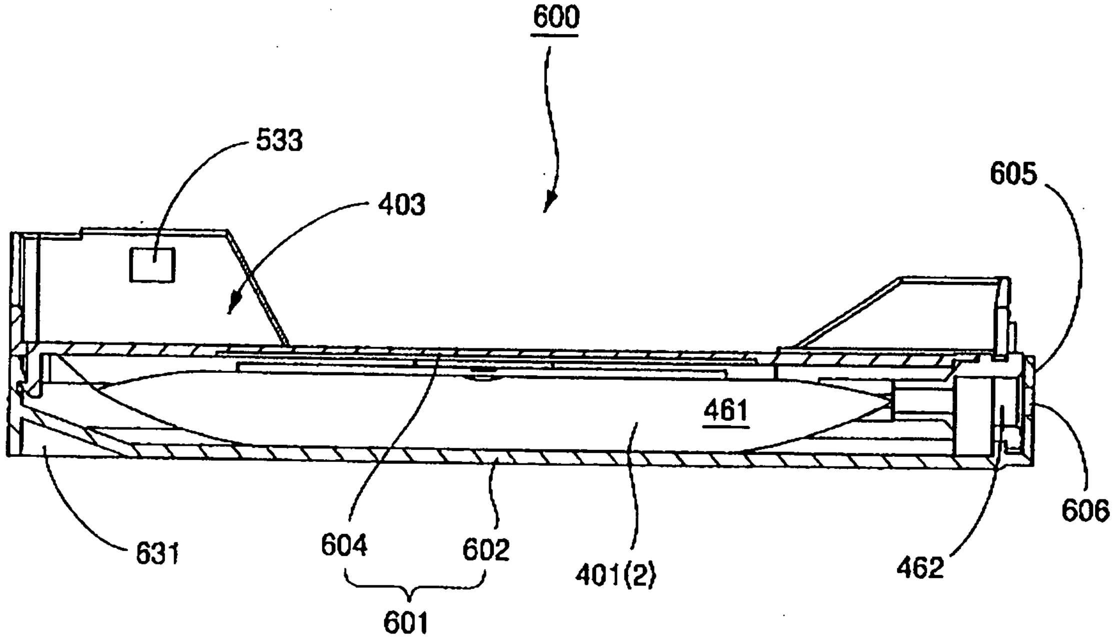
Fig.27


600
613
604
631
612
543
643
641
605
606
644
642
544
602
611

09771942.013001

09771942.015001

Fig.28


600
533
403
605
461
631
604
602
601
401(2)
462
606

09771943.013001

Fig.29

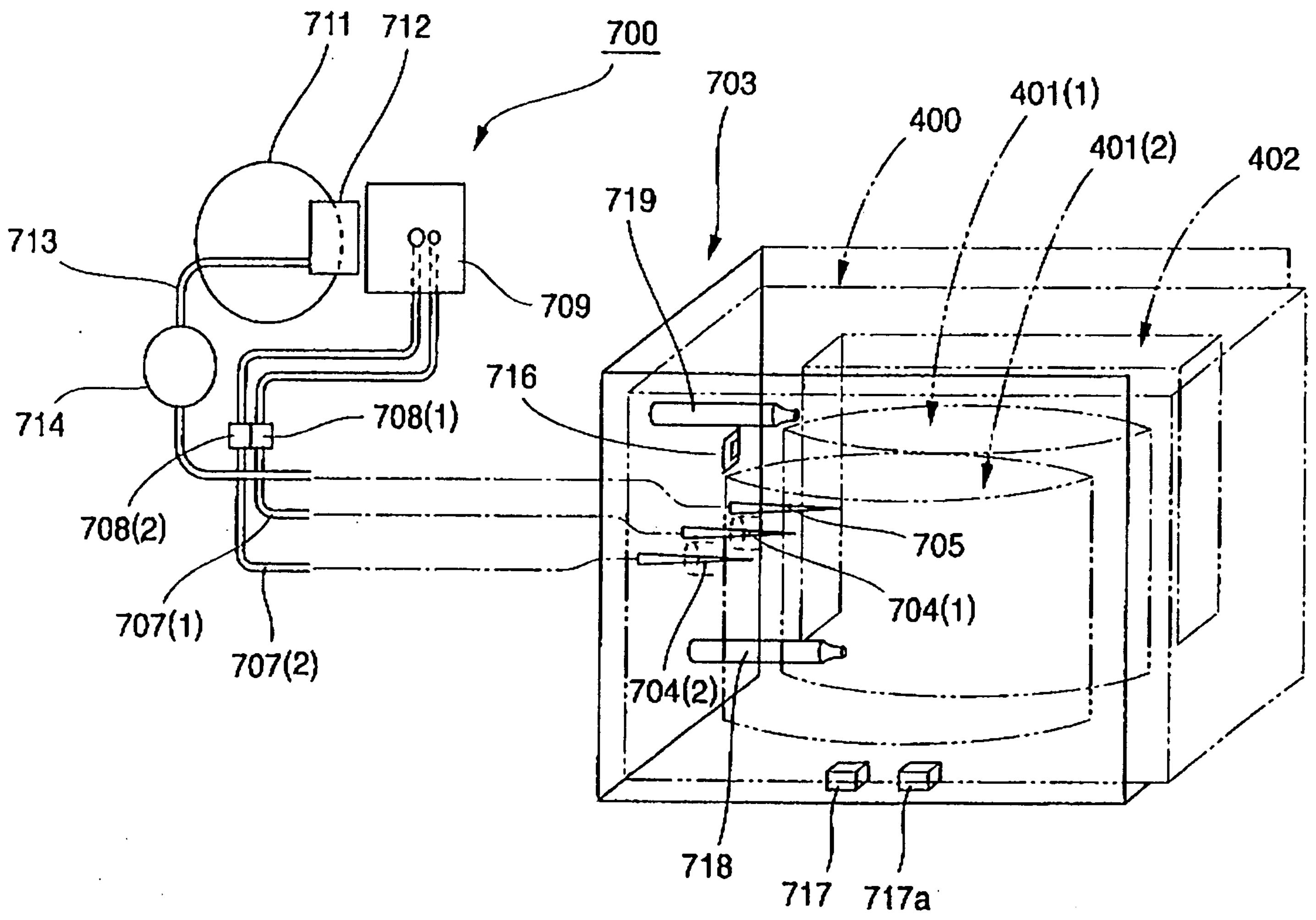

700
711
712
713
714
709
708(1)
708(2)
707(1)
707(2)
703
719
716
400
401(1)
401(2)
402
705
704(1)
704(2)
718
717
717a

Table1: In case of printing without color ink

First ink cartrige 500	second ink cartige 600	ink value for using printing		waste ink value	
		black ink	color ink	black ink	color ink
first	first	a1 (cc)	0 (cc)	(n2/n1) × b1 (cc)	b1 (cc)
	second	a2 (cc)	0 (cc)	(n2/n1) × b2 (cc)	b2 (cc)
	third	a3 (cc)	0 (cc)	(n2/n1) × b3 (cc)	b3 (cc)
	p'th	ap (cc)	0 (cc)	(n2/n1) × bp (cc)	bp (cc)
total			0 (cc)	(n2/n1) × Σbi (cc)	Σbi (cc)
Second (black ink) cartridge		a1+(n2/n1) × b1=a2+(n2/n1) × b2=····=V2			
First (color ink) cartirge		b1+b2+···bp=Σbi=V1			
waste ink value		(n2/n1) × Σbi+Σbi=((n2+n1)/n1) × Σbi			

09771946.012501

Table 2: In case of printing with color ink

First ink cartridge 500	Second ink cartridge 600	ink value for using printing		waste ink value	
		black ink	color ink	black ink	color ink
frist	frist	d1 (cc)	c1 (cc)	(n2/n1) × e1 (cc)	e1 (cc)
	second	d2 (cc)	c2 (cc)	(n2/n1) × e2 (cc)	e2 (cc)
	p'th	dq (cc)	cq (cc)	(n2/n1) × eq (cc)	eq (cc)
total			Σ ci (cc)	(n2/n1) × Σ ei (cc)	Σ ei (cc)
Second (black ink) cartridge		d1 + (n2/n1) × e1 = d2 + (n2/n1) × e2 = ‥‥ = V2			
First (color ink) cartrige		(c1 + ‥ + cq) + (e1 + ‥ + eq) = Σ ci + Σ ei = V1			
waste ink		(n2/n1) × Σ ei + Σ ei = ((n2+n1)/n1) × Σ ei			